桩承台计算\_序号24

# 一、设计资料

1、承台信息

承台底标高：-4.50m

承台高：300mm

承台x方向移心：0mm

承台y方向移心：0mm

2、桩截面信息

桩截面宽：500mm

桩截面高：0mm

单桩承载力：2500.00kN

3、承台混凝土信息

承台混凝土等级：C30

4.桩位坐标:

桩位表

| 桩序号 | 桩X坐标 | 桩Y坐标 |
| --- | --- | --- |
| 1 | -1000 | -1000 |
| 2 | -1000 | 1000 |
| 3 | 1000 | -1000 |
| 4 | 1000 | 1000 |

5.柱信息:

柱信息表

| 序号 | 截面宽 | 截面高 | 沿轴偏心 | 偏轴偏心 | 相对转角 |
| --- | --- | --- | --- | --- | --- |
| 柱1 | 700 | 700 | 0 | 0 | 0 |
| 外接柱 | 700 | 700 | 0 | 0 | 0 |

6.设计时执行的规范：

《建筑桩基技术规范》 （JGJ 94－2008） 以下简称 桩基规范

《混凝土结构设计规范》 （GB 50010－2010） 以下简称 混凝土规范

# 二、计算结果

1、桩承载力验算

承台及覆土重:

采用公式：

=±±

= Area×H×γ

= 9.0× 24.0

= 216.0 kN

∑ = 4000000.0 ∑ = 4000000.0

当前荷载组合

| 【4】SATWE标准组合:1.00\*恒+1.00\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4657.6kN =-26.5kN.m =-6.4kN.m =-12.9kN =12.1kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1159.39 | 1213.39 | 满足 |
| 2 | -1000.0 | 1000.0 | 1172.62 | 1226.62 | 满足 |
| 3 | 1000.0 | -1000.0 | 1156.20 | 1210.20 | 满足 |
| 4 | 1000.0 | 1000.0 | 1169.43 | 1223.43 | 满足 |

桩总反力= 4873.6 kN; 桩均反力= 1218.4 kN

当前荷载组合

| 【19】SATWE标准组合:1.00\*恒+1.00\*活-0.60\*风y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=6034.6kN =17.1kN.m =-7.5kN.m =-14.8kN =-19.0kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1514.81 | 1568.81 | 满足 |
| 2 | -1000.0 | 1000.0 | 1506.25 | 1560.25 | 满足 |
| 3 | 1000.0 | -1000.0 | 1511.04 | 1565.04 | 满足 |
| 4 | 1000.0 | 1000.0 | 1502.48 | 1556.48 | 满足 |

桩总反力= 6250.6 kN; 桩均反力= 1562.6 kN

当前荷载组合

| 【44】SATWE标准组合:1.00\*恒+0.50\*活+0.20\*风y+1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=4922.8kN =-93.8kN.m =-12.0kN.m =-17.6kN =62.5kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1210.24 | 1264.24 | 满足 |
| 2 | -1000.0 | 1000.0 | 1257.15 | 1311.15 | 满足 |
| 3 | 1000.0 | -1000.0 | 1204.23 | 1258.23 | 满足 |
| 4 | 1000.0 | 1000.0 | 1251.14 | 1305.14 | 满足 |

桩总反力= 5138.8 kN; 桩均反力= 1284.7 kN

当前荷载组合

| 【45】SATWE标准组合:1.00\*恒+0.50\*活-0.20\*风y-1.00\*地y |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=5828.5kN =95.6kN.m =-1.9kN.m =-10.1kN =-77.5kN

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) | 是否满足 |
| --- | --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1481.52 | 1535.52 | 满足 |
| 2 | -1000.0 | 1000.0 | 1433.70 | 1487.70 | 满足 |
| 3 | 1000.0 | -1000.0 | 1480.55 | 1534.55 | 满足 |
| 4 | 1000.0 | 1000.0 | 1432.73 | 1486.73 | 满足 |

桩总反力= 6044.5 kN; 桩均反力= 1511.1 kN

2、承台内力配筋计算

当前荷载组合

| 【54】SATWE基本组合:1.20\*恒+1.40\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7363.4kN =0.3kN.m =-9.2kN.m =-18.1kN =-8.0kN

承台及覆土重:

= 216.0×1.20= 259.2

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1843.21 | 1908.01 |
| 2 | -1000.0 | 1000.0 | 1843.08 | 1907.88 |
| 3 | 1000.0 | -1000.0 | 1838.60 | 1903.40 |
| 4 | 1000.0 | 1000.0 | 1838.47 | 1903.27 |

桩总反力= 7622.6 kN; 桩均反力= 1905.6 kN

台阶1 H = 900.00 mm

a、角桩冲切计算：

采用“桩基规范”5.9.8条,公式如下：

≤[

=, =

角桩No.=1

角桩冲切不足，增加承台台阶高度。

新台阶高: 950.00 mm

= 450. =0.50 = 700.

= 450. =0.50 = 700.

= 900. =0.8000 = 0.800 =0.99 = 1.433

=[( +/2)+ (+/2)]

= 1884.75 kN > = 1843.21(×1.00) kN

角桩No.=2

= 450. =0.50 = 700.

= 450. =0.50 = 700.

= 900. =0.8000 = 0.800 =0.99 = 1.433

=[( +/2)+ (+/2)]

= 1884.75 kN > = 1838.60(×1.00) kN

角桩No.=3

= 450. =0.50 = 700.

= 450. =0.50 = 700.

= 900. =0.8000 = 0.800 =0.99 = 1.433

=[( +/2)+ (+/2)]

= 1884.75 kN > = 1838.47(×1.00) kN

角桩No.=4

= 450. =0.50 = 700.

= 450. =0.50 = 700.

= 900. =0.8000 = 0.800 =0.99 = 1.433

=[( +/2)+ (+/2)]

= 1884.75 kN > = 1843.08(×1.00) kN

b、柱冲切计算：

采用“桩基规范”5.9.7条,公式如下：

≤2[

=, =

柱冲切不足,增加承台台阶高度。

新台阶高: 1000.00 mm

截面净高= 950.mm

X正方向:= 450. =0.474

X负方向:= 450. =0.474

Y正方向:= 450. =0.474

Y负方向:= 450. =0.474

= 700. = 700. = 1.25 = 1.25 = 1.43 =0.983

=2[( + ) + ( + )]

= 7677.47 kN > = 7363.36 × 1.00 kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

抗剪计算不足,增加承台台阶高度

新台阶高: 1050.00 mm

=1000. = 802. =0.450

= [1.75/(+1.0)]

=0.946\*[1.75/(0.450+1.0)]\*2310.\*1000.\*1.4329\*1.e-3

= 3778.0 kN

> = 3686.29 (\* 1.00) kN

2、右侧抗剪计算

=1000. = 450. =0.450

= [1.75/(+1.0)]

=0.946\*[1.75/(0.450+1.0)]\*2310.\*1000.\*1.4329\*1.e-3

= 3778.0 kN

> = 3677.07 (\* 1.00) kN

3、下侧抗剪计算

=1000. = 450. =0.450

= [1.75/(+1.0)]

=0.946\*[1.75/(0.450+1.0)]\*2310.\*1000.\*1.4329\*1.e-3

= 3778.0 kN

> = 3681.81 (\* 1.00) kN

4、上侧抗剪计算

=1000. = 450. =0.450

= [1.75/(+1.0)]

=0.946\*[1.75/(0.450+1.0)]\*2310.\*1000.\*1.4329\*1.e-3

= 3778.0 kN

> = 3681.56 (\* 1.00) kN

承台阶梯高度：

1阶高： 450mm

3、承台板抗弯计算

X方向配筋计算：

= 2396.09\*1.00= 2396.09 X = -350. H = 1000.

= /(0.9\*\*)/YS = 2396.09/(0.9\*1000.0\*360.0)/3.0= 2465.1 /m

= 2390.10\*1.00= 2390.10 X = 350. H = 1000.

= /(0.9\*\*)/YS = 2390.10/(0.9\*1000.0\*360.0)/3.0= 2458.9 /m

= 2396.09\*1.00= 2396.09 X = -350. H = 1000.

= /(0.9\*\*)/YS = 2396.09/(0.9\*1000.0\*360.0)/3.0= 2465.1 /m

Y方向配筋计算：

= 2393.17\*1.00= 2393.17 Y = -350. H = 1000.

= /(0.9\*\*)/XS = 2393.17/(0.9\*1000.0\*360.0)/3.0= 2462.1 /m

= 2393.01\*1.00= 2393.01 Y = 350. H = 1000.

= /(0.9\*\*)/XS = 2393.01/(0.9\*1000.0\*360.0)/3.0= 2461.9 /m

= 2393.17\*1.00= 2393.17 Y = -350. H = 1000.

= /(0.9\*\*)/XS = 2393.17/(0.9\*1000.0\*360.0)/3.0= 2462.1 /m

计算的钢筋面积：

= 2465./m = 2462./m

当前荷载组合

| 【55】SATWE基本组合:1.35\*恒+0.98\*活 |
| --- |

承台底面荷载 :（考虑柱底剪力的影响）

N=7605.0kN =0.9kN.m =-9.7kN.m =-19.2kN =-9.8kN

承台及覆土重:

= 216.0×1.35= 291.6

桩反力表

| 桩号 | X | Y | 桩净反力Qn(kN) | 桩反力Q(kN) |
| --- | --- | --- | --- | --- |
| 1 | -1000.0 | -1000.0 | 1903.92 | 1976.82 |
| 2 | -1000.0 | 1000.0 | 1903.47 | 1976.37 |
| 3 | 1000.0 | -1000.0 | 1899.05 | 1971.95 |
| 4 | 1000.0 | 1000.0 | 1898.60 | 1971.50 |

桩总反力= 7896.6 kN; 桩均反力= 1974.2 kN

c、承台抗剪计算

采用“桩基规范”5.9.9条,公式如下：

V<=

a=

=()

1、左侧抗剪计算

抗剪计算不足,增加承台台阶高度

新台阶高: 1100.00 mm

=1050. = 802. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3807.39 (\* 1.00) kN

2、右侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3797.64 (\* 1.00) kN

3、下侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3802.97 (\* 1.00) kN

4、上侧抗剪计算

=1050. = 450. =0.429

= [1.75/(+1.0)]

=0.934\*[1.75/(0.429+1.0)]\*2343.\*1050.\*1.4329\*1.e-3

= 4034.2 kN

> = 3802.07 (\* 1.00) kN

承台阶梯高度：

1阶高： 500mm

# 三、结果汇总

标准组合下桩反力:

最大最小桩反力及对应的标准组合

| 桩号 | 最大反力（非震）(Load) | 最小反力（非震）(Load) | 最大反力（震）(Load) | 最小反力（震）(Load) |
| --- | --- | --- | --- | --- |
| 1 | 1568.81 (19) | 1213.39 (4) | 1535.52 (45) | 1264.24 (44) |
| 2 | 1560.25 (19) | 1226.62 (4) | 1487.70 (45) | 1311.15 (44) |
| 3 | 1565.04 (19) | 1210.20 (4) | 1534.55 (45) | 1258.23 (44) |
| 4 | 1556.48 (19) | 1223.43 (4) | 1486.73 (45) | 1305.14 (44) |

桩平均反力最大值1562.65 (非震)(Load 19)

桩平均反力最小值1218.41 (非震)(Load 4)

桩平均反力最大值1511.13 (震)(Load 45)

桩平均反力最小值1284.69 (震)(Load 44)

基本组合下承台冲切、剪切、配筋计算:

角桩冲切计算：

桩 1: 抗力1884.75 kN 冲切力1843.21 kN ：900 mm (Load:54) H+

桩 2: 抗力1884.75 kN 冲切力1838.60 kN ：900 mm (Load:54)

桩 3: 抗力1884.75 kN 冲切力1838.47 kN ：900 mm (Load:54)

桩 4: 抗力1884.75 kN 冲切力1843.08 kN ：900 mm (Load:54)

抗剪计算：

1左边： 抗力4034.22kN 剪力3807.39kN ：1050mm (Load:55) H+

2右边： 抗力3778.05kN 剪力3677.07kN ：1000mm (Load:54)

3上边： 抗力3778.05kN 剪力3681.81kN ：1000mm (Load:54)

4下边： 抗力3778.05kN 剪力3681.56kN ：1000mm (Load:54)

承台高度：

承台高500

底板配筋计算：

X方向：弯矩2396.09 kN.m 计算钢筋面积2465 /m Load： 54

Y方向：弯矩2393.17 kN.m 计算钢筋面积2462 /m Load： 54